5.0 CONCLUSIONS AND RECOMMENDED ALTERNATIVE

Service Area

The Tier II Service Area encompasses approximately 7,542 developable acres, while the Total Ridgeline Service Area includes a total of 8,410 developable acres (from Table 2.1). The full pipe capacity of the existing 48-inch trunk sewer is 49.8 cfs, which, based on the City's design equation, yields a service area of 8,550 acres. The existing trunk sewer is already serving the S-1 Urban Planning Zone, an area of 748 acres. The remaining service area capacity of the existing trunk sewer is then (8,550 acres – 748 acres) = 7,802 acres.

The Tier II Service Area is the recommended option. The additional area beyond Tier II in the Total Ridgeline boundary is not within the future service limit of the City of Lincoln, due to its proximity to the Village of Roca. Selection of the Tier II option is the lower cost alternative, due to the selection of a 48-inch pipe size, versus the 54-inch pipe required to serve the larger area. The Total Ridgeline service area is larger than the existing trunk sewer can accommodate, based on design peak flows.

Pipe Size

Due to available grade and potential elevation conflicts with the existing drainage channel for the S-2/S-3 drainage basin, and based on design flows for each service area, providing gravity sewer service to the Tier II area requires a 48-inch diameter sewer. The additional area of the Total Ridgeline option requires a 54-inch diameter sewer to provide enough flow capacity and still meet the grade limitations. However, the hydraulic grade line analysis decribed in Section 2.3 and Table 2.3 show that a 48-inch diameter pipe could serve the larger area, if a tolerable amount of surcharge is allowed in the pipeline.

Rokeby Road Alignment

Three options were proposed for the bored crossing of the BNSF railroad near Rokeby Road. The first option is a perpendicular bore north of the road, which avoids the woodland area of Wilderness Park, but is deeper on the east end and intersects the Dakota sandstone formation. The second option is a long diagonal bore under the railroad, to avoid the woodland area and the extra depth on the east side. The third option is a perpendicular bore south of the road, which encroaches in the woodland area, but avoids the extra depth on the east side.

Based on the selection criteria and ranking of the three alternatives in Table 4.1, the north crossing is slightly favored over the diagonal and south crossings. However, before the alignment is selected for final design, additional geotechnical investigations should be performed to determine de-watering methods and costs, as well as the actual extent of the rock formation in this area. This will directly affect cost and constructibility issues, and may alter the outcome of the ranking analysis.

Cost Estimates

The six cost estimates derived from the two service area/pipe size alternatives and the three alternative Rokeby road alignments show that the Tier II/48-inch pipe option is approximately $ 550,000 less expensive than the Total Ridgeline/54-inch pipe option. The additional cost is due to increased material cost for the pipe, an increase in excavation and bedding costs, and increase in the diameter of the casing pipes for the bores.

For each of the service area alternatives, the cost of the north and south crossings of the BNSF railroad at Rokeby Road are equivalent, with the cost for extra depth and rock excavation at the north offset by the additional clearing and restoration costs at the south. In each of the two service area alternatives, the long diagonal bore under the BNSF railroad was the most expensive option.

Each of these cost estimates contains a large contingency factor (25%) to reflect the uncertainties of the amount of rock excavation that will be required, and the specifics of park restoration requirements.

Recommended Alternative

Alternative 1A (Tier II service area / 48-inch pipe / north crossing at Rokeby Road) is the most cost effective option for the Lincoln Wastewater System, and represents the least construction impact and encroachment into Wilderness Park.

If a slight amount of hydraulic surcharge is deemed tolerable in the proposed trunk sewer (and in the existing trunk sewer) during peak flow events, the 48-inch pipe could potentially serve the Total Ridgeline area. This may be preferable to the additional cost of over $ 0.5 Million for a 54-inch pipe, in order to serve the additional 868 acres in the Total Ridgeline service area.

GENERAL RECOMMENDATIONS

In order to select the best option and ensure the success of the project, it is recommended that the Project Partnering Approach be continued through the final design and construction phases of this project. Making a sound fiscal decision, providing for the long-term operational and maintenance needs of the Lincoln Wastewater System, and providing protection and oversight of the unique habitat in Wilderness Park will require input from a wide range of stakeholders on this project. A committee of Project Partners, representing each of the various disciplines and stakeholder groups, should be created to assist the City and the Engineer with plan selection during final design.